

NJDOT Bureau of Research
QUARTERLY PROGRESS REPORT

Project Title:	Compatibility of Highway Railroad Crossing Gates with Overhead Catenary System High Voltage Power for Trains		
RFP NUMBER: 2004-04	NJDOT RESEARCH PROJECT MANAGER: Edward Kondrath (replaces Karl Brodtman)		
TASK ORDER NUMBER::9	PRINCIPAL INVESTIGATOR: William Riddell		
Project Starting Date: January 1, 2005 Original Project Ending Date: 12/31/06 Modified Completion Date:	Period Starting Date: April 1, 2005 Period Ending Date: June 30, 2005		

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
1. Preliminary Literature Search	5%		100%	5%
2. Detailed Work Plan	5%	25%	75%	3.75%
3. Comprehensive Literature Search	15%	33%	66%	10%
4. Review and Eval. Of Crossings	25%	25%	25%	7.5%
5. Propose Solutions	25.0%	10%	10%	2.5
6. Develop of Verification Plan	12.5%			
7. Verification of Solutions	25.0%			
Final Report	12.5%			
TOTAL	100%			28.75%

Project Objectives:

1. Determine the extent of the problems with crossing gates contacting the overhead catenary system (OCS) that supplies 25,000 volts, 60 Hz propulsion power to the trains. Included in the problem evaluations will be all of the consequences of the high voltage power supply contacting the crossing gates.
2. Review previous unsuccessful attempts at solutions and the reasons why these solutions did not succeed. Success is defined as no failures.
3. Propose new solutions in all areas such as mechanical (alternative breakaway schemes), electro-mechanical (gate construction), electronic (surge protection, isolation, etc.); high voltage laboratory and field testing of all proposed solutions, etc. Include combinations of solutions if warranted.
4. Provide for verification of the construct ability of the solutions through test prototypes, the maintainability, the reliability, for the compliance with legal and regulatory requirements.
5. Demonstrate that the solutions are commercially viable and include all requirements for commercial implementation.

Project Abstract:

NJ TRANSIT has more than 400 highway railroad crossings equipped with automatic gates. On occasion, through collision damage, wind, or other causes, gates come in contact with high voltage power lines, causing severe damage and hazardous conditions, especially in
As of 7/16/2005

areas where rail lines have 25 kV overhead traction power lines. NJ TRANSIT needs to have a comprehensive evaluation performed on various conceptual solutions to this problem. As a minimum, the project must: Research the extent of the problem, Search literature and manufacturers for potential solutions, Evaluate alternative solutions, and Recommend a commercially viable solution including all requirements for implementation.

1. Progress this quarter by task:

Task 1. Preliminary Literature Search – Hardcopy completed.

Task 2. Detailed Work Plan – The group has formulated an approach based on discussions with, and additional data provided by NJ Transit. Aspects of project to be completed by consultants will be incorporated into existing plans.

Task 3. Comprehensive Literature Search. – Feedback and additional data from NJ DOT was incorporated into the preliminary literature search. Additional information on available products was obtained. Phil Olekszyk (World Wide Rail) and Bill Goodman have been hired as consultants for the project (paperwork signed July 11, 2005).

Task 4. Review and Evaluation of Crossings

a) Review of Grade Crossings. – A complete database of electrified grade crossings has been developed. Satellite images of all crossings, as well as pertinent information from equipment inventory reports have been collected. Additional sidewalk visits have been performed (no incursions on NJ Transit property during these visits). Approximately 30 of 93 sites have been visited.

b) Evaluation of Grade Crossings. - Incident reports provided by NJ Transit have been compared with the crossings database to develop some hypotheses regarding root causes of incidents.

c) Development of Model for Phase-to-Ground Faults. – A model for electrical faults is being developed. The modeling efforts have been refocused on resistance of crossing arm. This model will be used to predict the effectiveness of various proposed fixes.

2. Proposed activities for next quarter by task

Task 2. Development of Detailed Work Plan. Discuss and Finalize Work Plan with NJ DOT.

Task 3. Comprehensive Literature Search will be worked on. Finalize a contract with World Wide Rail to assist with final literature review and future efforts.

Task 4. Review and Evaluation of Crossings

Additional sidewalk site visits (no incursions on NJ Transit property). Development of detailed studies of sites where damaging incidents have occurred.

3. List of deliverables provided in this quarter by task (product date)

Presentation of Results from Preliminary Literature Search..

4. Progress on Implementation and Training Activities

As of 7/16/2005

None

5. Problems/Proposed Solutions

The process of hiring consultants acceptable to NJ Transit took longer than anticipated. This has resulted in a delay in some aspects of the final literature review. At the last quarterly meeting, NJ DOT approved two consultants. The final contract was signed on July 10th. Efforts involving the consultants will now be able to progress. While this has delayed submitting the detailed work plan and the comprehensive literature review, it will not result in a delay in the final project schedule, or the final budget of the project.

Total Project Budget	\$256,787
Modified Contract Amount:	\$256,787
Total Project Expenditure to date	\$3,932.49
% of Total Project Budget Expended	1.5%

As of 7/16/2005

NJDOT Bureau of Research
QUARTERLY PROGRESS REPORT

Project Title:	Safety Audit of Fatalities and Injuries Involving Guide Rail		
RFP NUMBER:	2003-34	NJDOT RESEARCH PROJECT MANAGER: Nazhat Aboobaker	
TASK ORDER NUMBER:	99ROW1-8	PRINCIPAL INVESTIGATOR: John C. Chen Rowan University	
Project Starting Date:	1/1/2004	Period Starting Date:	April 1, 2005
Original Project Ending Date:	12/31/2005	Period Ending Date:	June 30, 2005
Modified Completion Date:			

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search	5		100	5
1. Comprehensive Literature Survey	5		100	5
2. Locate and Assemble Documented information on Fatal and Injurious Accidents involving Guide Rail	20	5	95	19
3. Determine Unsolved Guide Rail Problems	10	30	30	3
4. Evaluate Fatal and Serious-Injury Guide Rail Accident Sites	50	16	86	43
Final Report	10			
TOTAL	100%			75

SAFETY AUDIT OF FATALITIES AND INJURIES INVOLVING GUIDE RAIL

NJDOT Research Task Order 8 Quarterly Progress Report – June 2005

Project Objectives:

The goal of this study is to evaluate fatal and injury-causing guide rail accidents in New Jersey. The specific objectives are to:

- 1) Locate and assemble documented information on fatal and injurious guide rail impacts.
- 2) Identify all ongoing research involving guide rail accidents.
- 3) Determine unsolved guide rail collision problems.
- 4) Evaluate fatal and injury-causing impacts with guide rails in New Jersey, and recommend actions for improvements in guide rail safety performance.

Project Abstract:

Guide Rails are designed to protect vehicle occupants from trees, poles, side slopes and other hazards they may encounter in run-off road accidents. Unfortunately, a guide rail is not always a forgiving object to strike. In 2001, there were 1143 fatal crashes and 34,000 injurious crashes into guide rails in the United States.

The reasons why guide rail impacts sometimes lead to fatality or injury are complex and not completely understood. Guide rail problems include, but are not limited to, many of the following issues (1) improper installation, (2) impacts with end treatments, (3) unfavorable roadside conditions, e.g. soft soil or excessive side slope (4) side impact, (5) improper redirection after a crash, and (6) wheel snagging. Guide rail performance can be affected not only by barrier design, but also by vehicle design. Poor guide rail performance may result from (1) light trucks overturning on impact with guide rail, (2) cars “submarining” under the rail, (3) airbag-induced injuries, and (4) incompatibility with heavy trucks.

The goal of this study is to evaluate fatal and injury-causing guide rail accidents in New Jersey. The approach will be to investigate this issue through the combination of a comprehensive literature survey, interviews with roadside safety researchers on ongoing research, examination of U.S. and state accident databases, and, most importantly, site investigation of guide rail accidents which result in either fatal or serious occupant injury. The proposed research program will evaluate all fatal guide rail accidents which occur in New Jersey during the contract period, and will also examine a focused subset of guide rail accidents which result in serious, but non-fatal, injury. Implementation of the findings from this project should substantially benefit the NJDOT by providing an improved understanding of those installation or design factors which lead to guide rail related fatalities and injuries.

1. Progress this quarter by task:

- Meeting with NJDOT. A meeting for the project was held on April 8, 2005 at NJDOT headquarters. The PI and the Project Panel discussed findings from New Jersey and national accident data, future directions for analysis of available accident data, results of accident investigations to date, as well as other potential guide rail crash notification avenues.
- Task 2 – Locate and Assemble Documented Information on Fatal and Injurious Accidents Involving Guide Rail.
 - ❑ The research team has analyzed fatal and injurious New Jersey guide rail accidents based upon New Jersey highway accident statistics. Preliminary results were presented at the October 12, 2004 and April 8, 2005 meetings. A draft report documenting the findings to date has been prepared for review by the project panel. A synopsis of the results will be presented.
 - ❑ To characterize the current national experience in fatal guide rail accidents, the research team has analyzed the FARS and NASS/GES databases. Preliminary results were discussed at the April 8, 2005 meeting. A draft report documenting the findings to date has been prepared for review by the project panel. A synopsis of the results will be presented.
 - ❑ The research team is continuing an investigation of the NASS/CDS database to determine national experience with injury-causing guide rail accidents. A draft report of the findings is currently being prepared.
 - ❑ A copy of the Longitudinal Barrier Special Study (LBSS) has been obtained and the research team is in the process of analyzing the database. The research team is continuing to explore the use of other potentially applicable specialized accident databases.
- Task 3 – Determine Unsolved Guide Rail Collision Problems
 - ❑ Based on the literature review and accident data analysis findings to date, the research team is beginning to assemble a list of unsolved guide rail problems. The list will be updated with additional findings from Task 2 as well as findings from Task 4.
- Task 4 - Evaluate Fatal and Serious-Injury Guide Rail Accident Sites.
 - ❑ The research team has investigated guide rail performance in nine crashes to date. Most recently, the team investigated a length of need impact on northbound I-295 in Mount Laurel. A copy of the accident investigation report is being prepared for review by the Project Panel.

- ❑ Despite a continued effort to disseminate information to towing companies in the surrounding area, the research team has had no additional notifications of guide rail accidents. To date, a total of two accident investigations have been a result of notification via a towing company. The research team continues to explore other potential avenues for improving notification. Additional discussion will be provided at the upcoming meeting.

2. Proposed activities for next quarter by task

- Complete Locating and Assembling Documented Information on Fatal and Injurious Accidents Involving Guide Rail
- Continue Determination of Unsolved Guide Rail Problems
- Continue Investigation of Guide Rail Collision Sites

3. List of deliverables provided in this quarter by task

- Summary of Task 2.2: “Determine National Experience in Fatal Guide Rail Accidents”
- Summary of Task 2.6: “Analyze Fatal and Injurious New Jersey Guide Rail Accidents”

4. Progress on Implementation and Training Activities

- None Scheduled

5. Problems/Proposed Solutions

- None Scheduled

Total Project Budget	238,440
Modified Contract Amount:	
Total Project Expenditure to date	125,301.70
% of Total Project Budget Expended	52.6%